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NINE MILE POINT
NUCLEAR STATION

November 5, 2013

U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

ATTENTION: Document Control Desk

SUBJECT: Nine Mile Point Nuclear Station Unit 1
Renewed Facility Operating License No. DPR-63
Docket No. 50-220

Revision 1 to Licensee Event Report 2012-005, Feedwater Level Control Failure, HPCI Initiation and Reactor Scram

Licensee Event Report (LER) 2012-005, Feedwater Level Control Failure, HPCI Initiation and Reactor Scram, was submitted on December 21, 2012 in accordance with 10 CFR 50.73(a)(2)(iv)(A). Attached is Revision 1 to LER 2012-005. This supplement is submitted to update the root cause of the event and associated actions.

There are no regulatory commitments in this submittal.

Should you have questions regarding the information in this submittal, please contact Everett (Chip) Perkins, Director-Licensing, at (315) 349-5219.

Sincerely,

JJS/KJK

Attachment: Revision 1 to Licensee Event Report 2012-005, Feedwater Level Control Failure, HPCI Initiation and Reactor Scram

cc: Regional Administrator, NRC
Project Manager, NRC
Resident Inspector, NRC

IE22
NRR

ATTACHMENT

REVISION 1 TO LICENSEE EVENT REPORT 2012-005

FEEDWATER LEVEL CONTROL FAILURE, HPCI INITIATION AND REACTOR SCRAM

Nine Mile Point Nuclear Station, LLC
November 5, 2013

NRC FORM 366 (10-2010) | U.S. NUCLEAR REGULATORY COMMISSION | APPROVED BY OMB: NO. 3150-0104 | EXPIRES: 10/31/2013

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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4. TITLE

Feedwater Level Control Failure, HPCI initiation and Reactor Scram

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									NA	NA
11	03	2012	2012	005	1	11	05	2013	FACILITY NAME: NA	DOCKET NUMBER: NA

9. OPERATING MODE

N

10. POWER LEVEL

024

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Everett (Chip) Perkins, Director - Licensing	(315) 349-5219

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	JB	AMP	Toshiba	Y	X	SJ	75*	Fisher	Y

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR
NA	NA	NA

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On November 3, 2012, at 0825, Nine Mile Point Unit 1 (NMP1) experienced an unexpected rise in reactor water level followed by a turbine trip and subsequent reactor scram on low Reactor Pressure Vessel (RPV) water level at 53 inches. During this sequence of events, multiple separate and valid initiation signals for High Pressure Coolant Injection (HPCI) occurred.

The initial rise in RPV water level was caused by a failure in the Feedwater System three element control of reactor water level resulting in a maximum demand open signal being sent to the 11 Feedwater flow control valve (11 FCV). Subsequent level transients were due to the failure of the 11 FCV to operate properly to control water level. The root causes of this event were selection of an inappropriate Preventive Maintenance (PM) strategy and not changing the PM program to test electronic components for end-of-life failure mechanisms. Corrective actions to address the root cause include replacement of the failed electronic components, revision of the PM program for the feedwater FCVs and revision to the electronic module refurbishment program to check transistors.

This event is reportable in accordance with 10 CFR 50.73 (a)(2)(iv)(A) as a valid actuation of the reactor protection system and initiation of the high pressure coolant injection system.

LERs for similar events are; 85-004, 86-024, 90-015, 96-004 and 04-004.

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NARRATIVE

I. DESCRIPTION OF EVENT

A. PRE-EVENT PLANT CONDITIONS:

Prior to this event, Nine Mile Point Unit 1 (NMP1) was in a plant startup conducting power ascension and operating at 24 percent power. The 11 feedwater flow control valve (11 FCV) was in automatic and the 12 feedwater flow control valve (12 FCV) was in manual. Preparations were being made to place the 13 turbine shaft driven feedwater pump into service. There were no inoperable systems or components related to the issue. There was no maintenance or testing being conducted that could have contributed to the event.

B. EVENT:

On November 3, 2012, at 0825, Nine Mile Point Unit 1 (NMP1) experienced an unexpected rise in reactor water level followed by a turbine trip and subsequent reactor scram on low Reactor Pressure Vessel (RPV) water level at 53 inches. During this sequence of events, multiple separate valid initiation signals for High Pressure Coolant Injection (HPCI) were received. The unexpected rise in RPV water level was caused by a failure in the Feedwater System three element control of reactor water level. A proportional amplifier, ID23G, working in concert with a computation module, ID66A, experienced a loss of output signal which resulted in a maximum demand open signal being sent to the 11 Feedwater flow control valve.

The rising water level resulted in the 11 HPCI train initiating on a valid signal due to reaching the excessive feedwater flow rate setpoint of 1.9 Mlbm/hr (pump runout conditions) for the 11 feedwater pump. A turbine trip occurred on high reactor water level of 95 inches. Another valid HPCI initiation signal was received for both HPCI trains as a result of the turbine trip. The 12 HPCI train initiates with the turbine trip signal. After the second initiation signal for the 11 HPCI train, the 11 motor driven feedwater pump, operating in HPCI mode, tripped on sustained high RPV water level with the 11 FCV not fully shut. Reactor water level lowered, and an automatic reactor scram occurred on low RPV water level of 53 inches. Concurrent with the reactor scram, another valid HPCI initiation signal was received for both HPCI trains, restarting the 11 motor driven feedwater pump in HPCI mode. All HPCI initiation signals and the tripping of the 11 feedwater pump occurred as designed. At 0826, RPV water level was restored above the HPCI low level actuation set point, the HPCI initiation signal was reset, and the HPCI system was secured. After the turbine trip and reactor scram, the turbine bypass valves operated properly to control reactor pressure. All control rods fully inserted.

The HPCI system is an operational mode of the feedwater system and is not an Emergency Core Cooling System (ECCS).

There was no impact on Nine Mile Point Unit 2 (NMP2) from this event.

The notification per 10 CFR 50.72(b)(2)(iv)(B) for RPS actuation and 10 CFR 50.72 (b)(3)(iv)(A) for HPCI initiation were completed on November 3, 2012 at 1150 (Event Number 48477).

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NARRATIVE

C. INOPERABLE STRUCTURES, COMPONENTS, OR SYSTEMS THAT CONTRIBUTED TO THE EVENT:

Prior to the event, there were no inoperable components or systems that contributed to this event.

D. DATES AND APPROXIMATE TIMES OF MAJOR OCCURRENCES

All times below are approximate and occurred on 11/03/2012;

0822 - RPV water level begins to increase due to the 11 FCV opening.

0823 - The first 11 HPCI train initiation occurs and the 11 FCV begins to close in HPCI mode due to meeting the condition for pump run-out for the 11 Feedwater pump. Two-tenths of a second later, the turbine trips on RPV high water level. Another valid HPCI initiation signal was received for both HPCI trains as a result of the turbine trip. The 12 HPCI train initiates with the turbine trip signal. The 11 feedwater pump tripped on high RPV level.

0825 - Reactor scram due to RPV low water level. A third valid HPCI initiation signal is received for the 11 HPCI train, restarting the 11 motor driven feedwater pump in HPCI mode.

0826 - Reactor water level is restored above the low water level set point and HPCI system secured.

E. OTHER SYSTEMS OR SECONDARY FUNCTIONS AFFECTED:

None

F. METHOD OF DISCOVERY:

This event was discovered by the operators when the annunciator for High Reactor Water Level was received in the control room.

G. MAJOR OPERATOR ACTION:

On November 3, 2012, at 0822, operators received the annunciator for High Reactor Water Level. After the change in reactor water level was validated per the alarm response procedure, the operator shut the 12 FCV manually in an attempt to manually control RPV water level.

After the scram, the operators verified all rods fully inserted. No other actions were required to support shutting down the reactor.

The operators reset HPCI after RPV water level was restored.

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H. SAFETY SYSTEM RESPONSES:

All safety systems responded per design with the exception of the slow response of the 11 FCV to HPCI demand signals. The 11 HPCI system received 3 initiation signals as designed and the 12 HPCI system received 2 initiation signals as designed. There was no loss of offsite power to the onsite emergency buses. The ECCS systems were available, but not called upon to support the safe shutdown of the reactor.

II. CAUSE OF THE EVENT:

There were two root causes of this event. One root cause is an inappropriate Preventive Maintenance (PM) strategy selected for the 11 FCV. The PM analyst made an inaccurate assumption that the 2-year calibration testing of these components was an adequate alternative PM when creating the Nine Mile Point (NMP) PM strategy from the Corporate PM template. This human performance error was not recognized during approval. The NMP PM template only included a calibration of the positioner every 2 years. The NMP PM template did not include PMs to include stroke time testing of the 11 FCV to ensure the stroke time design requirement of less than 4 seconds was being met.

The second root cause is the need to change the PM program to include testing for transistor degradation as a new end-of-life failure mechanism of Single Point Vulnerable (SPV) components was not recognized. Transistors do not normally fail, and are not normally tested for degradation. Because transistor failures are not common, a program or process to check them is not used at NMP. NMP1 is one of the oldest operating commercial nuclear plants in the United States. The period of extended operation for license renewal was entered in 2009. As components age, new failure mechanisms for end-of-life related failures need to be identified. The transistors were between 27 and 31 years old at the time of failure and were installed on a board that had been refurbished 17 years ago. The current PM program to refurbish electronic modules is every 20 years and bounds a transistor failure only if the transistors are tested and replaced during the electronic module refurbishment process.

This event was entered into the Nine Mile Point Nuclear Station (NMPNS) corrective action program (CR-2012-010039).

III. ANALYSIS OF THE EVENT:

This event is reportable in accordance with 10 CFR 50.73 (a)(2)(iv)(A), as an event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph 10 CFR 50.73 (a)(2)(iv)(B). Both the RPS and HPCI system (an operating mode of the feedwater system) were actuated during this event. Both systems are listed in 10 CFR 50.73 (a)(2)(iv)(B).

The equipment failures associated with this event were a proportional amplifier, ID23G, in the Feedwater System three element control circuitry and the degraded positioner on the 11 FCV. All other plant systems performed per design. Plant parameters, other than the RPV water level, remained within normal values throughout the event. There was no loss of offsite power to the onsite emergency buses, both trains of HPCI initiated as designed, and the ECCS systems were available, but not called upon to support the safe shutdown of the reactor.

NARRATIVE

Had a design basis accident occurred coincident with this event, plant systems would have responded per design to mitigate the accident. The HPCI system is an operating mode of the feedwater system available in the event of a small reactor coolant line break which exceeds the capability the control rod drive system pumps. HPCI is not an engineered safeguards system and is not considered in any loss of coolant accident analysis. A single train of HPCI, along with one emergency cooling system, has the capability of keeping the swollen reactor coolant level above the top of active fuel for small reactor coolant boundary breaks up to 0.063 square feet for at least 1000 seconds. The 12 HPCI train was operable during this event. Based on the above considerations, the safety significance of this event is very low, and the event did not pose a threat to the health and safety of the public or plant personnel.

This event affects the NRC Regulatory Oversight Process (ROP) Index for Unplanned Scrams. Due to this scram, the Unplanned Scrams Index value will be approximately 3.3 compared to the Green-to-White threshold value of greater than 3. This reduction will result in entry into the "Increased Regulatory (White) Response Band."

IV. CORRECTIVE ACTIONS:

A. ACTION TAKEN TO RETURN AFFECTED SYSTEMS TO PRE-EVENT NORMAL STATUS:

1. The computation module, ID23G, was replaced.

2. The positioner on the 11 FCV was replaced.

3. The plant was returned to full power on November 10, 2012.

B. ACTION TAKEN OR PLANNED TO PREVENT RECURRENCE:

1. Review the PM strategies for SPV components that deviated from the PM templates and verify the selected alternative PMs are adequate to prevent component failure, are well documented, meet the intent of the PM template and have been reviewed and approved.

2. Update the Procurement Requirements for refurbishment of safety related and augmented quality electronic modules (GEMAC, TOSMAC, Bailey, NUS) to include a check for transistor degradation and replacement of degraded transistors, as necessary.

3. Install fault tolerance system for NMP1 Feedwater system.

4. Develop testing method and acceptance criteria for 11 and 12 FCVs that provides confidence the valve and positioner will provide optimum performance to meet design requirements.

V. ADDITIONAL INFORMATION:

A. FAILED COMPONENTS:

1. Computation module ID23G for feedwater level.

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2. The positioner on the 11 feedwater system flow control valve, FCV-29-141.

B. PREVIOUS LERs ON SIMILAR EVENTS:

There are 5 previous LERs for events related to RPV high water level and subsequent HPCI initiation. The causes and actions in the previous LERs were different from this event and would not have prevented this event. The 5 previous LERs are 85-004, 86-024, 90-015, 96-004 and 04-004.

C. THE ENERGY INDUSTRY IDENTIFICATION SYSTEM (EIIS) COMPONENT FUNCTION IDENTIFIER AND SYSTEM NAME OF EACH COMPONENT OR SYSTEM REFERRED TO IN THIS LER:

COMPONENT	IEEE 803 COMPONENT IDENTIFIER	IEEE 805 SYSTEM IDENTIFICATION
Proportional Amplifier	AMP	JB
Positioner	75*	SJ
Feedwater Level Control System	N/A	JB
Feedwater System	N/A	SJ
High Pressure Coolant Injection System	N/A	BJ
Reactor Protection System	N/A	JC
Reactor Pressure Vessel	RPV	NA

D. SPECIAL COMMENTS:

None